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WHAT MINIMUM OF PRACTICAL APPLICATIONS SHOULD BE INCLUDED IN A COURSE IN ARITHMETIC? WHAT ADDITIONAL APPLICATIONS SHOULD BE INCLUDED FOR PURPOSES OF MENTAL DISCIPLINE?

By William Reed.

The subject which you have assigned to this paper is one of extreme importance; much more so than is generally supposed. The development of our foreign trade has brought into sharp comparison the American and foreign born scholar, especially the German, and many business men believe that our own people do not stand the test satisfactorily. As against this I am inclined to think that most men lean toward the idea that the so-called "old time methods" were best because that was the way they were brought up and a natural prejudice exists in their minds in favor of the systems with which they are familiar. There is more or less sentiment in that view so that in considering "the pessimistic utterances of business men" on this general subject, some allowance should be made for bias. If an attempt were made to thoroughly teach business practices in the schools, a competent graduate might still be criticised, by a short-sighted business man, for lack of technical knowledge and for not being able to immediately grasp the intricate details of a particular business or trade. That would be extremely unjust, for no two concerns manage their internal affairs by identical methods. Even in banks, whose business is so carefully defined by law, differing styles of bookkeeping are in active use, so that an experienced clerk, changing from one bank to another, would find many new things to learn as far as system is concerned. But it *is* true that the German youth who comes to this country to engage in banking or other lines of business seems to be better equipped at the outset than the American boy of the same age and station in life. This is unquestionably due to system in schooling, for I doubt if any foreign people possess greater natural advantages than do we. In discussing a question of this kind, too, everyone is inclined to consider only his own point of view, and it may be that absence from school for so many years has developed rigid ideas in my own case and I may be mistaken, but from what I have been able to observe I am convinced that our modern public schools attempt too many things at the expense of thoroughness in the essentials.

To teach every boy and girl drawing and music, biology and snatches of difficult science, without any regard for aptitude, is to the business man, absurd. It might be wise to establish classes in those and similar studies for scholars who naturally lean to them or whose parents express that desire. But there is a well-defined opinion held by many people that these specialties are frequently established not for the sake of the pupil, but to gratify the whims of faddists. If a child has special ability along special lines, it should be developed in a special place or class, but not in the general classes of a public school If all the hours of school study were completely given over to arithmetic, grammar, including reading and writing, modern history, geography and languages, I believe the results to the commercial world would be immensely improved. And even in these studies the predominating feature should be to train the pupil to *think* rather than to cram him full of information. Experience and training make me more sympathetic with your particular branch of teaching than any other, and I should like to see it emphasized still more in the public school curriculum. *That* and modern languages constitute the real need of the boy graduating from public school.

The very young scholar should, of course, be taught to add, subtract, multiply and divide, and in this part of his studies I believe in thorough drilling, so that as he advances into deeper water no time need be wasted on that feature. The young pupil is competent to attain to very great dexterity in the elementary classes, and if he is properly trained the teacher of advanced grades is relieved of a great burden for the attention of the scholar can then be fixed and stay fixed on the explanation of an example and not be diverted by the struggle with the mechanical part of the work. This is such a simple thing that it hardly seems worth mentioning, but I have no doubt that many of our difficulties lie right there. I believe also in thorough teaching of fractions and decimals, not at first with a particular application, but in an abstract way only. Then, when mastery of the operation of these is obtained, begin to apply. And it is at this point in the child's studies that the skill and experience of the teacher are put to the test. You know very much more about that than I do, and it is unnecessary to dwell on it, but we all know that some possess in greater degree than others the faculty of explanation.

After complete facility in figuring is acquired, I think the reason for every step should be made clear and the pupil made to go through it audibly, so that not only is he taught methods but the habit of reasoning is developed, then if a trifling change is made in the nature of a given problem the consequent change in reasoning would instantly occur to the mind; the idea being, as I have already noted, not to accumulate information but to *teach thinking.* I believe that a good teacher does a great deal of talking. Examples in measurements, costs and profit and loss are essential and I understand are very generally adopted, but let me put in a plea right here to make your examples as near to real conditions as possible. For instance, in giving an example to ascertain the number of yards of carpet at a certain price needed to cover a room of a given size, make your price about what a moderate carpet really would cost and the width of the breadths the standard size. And one other thing. I don't believe in teaching "short cuts" *until* the long way round is thoroughly understood. Only a short time ago I was amazed to find my daughter doing some home work and attempting a short method by a process of cancellation just because she was told to do so. She had no idea how to do it by the process of reasoning. I was taught in school, in figuring interest, to multiply by the days and divide by six to ascertain what six per cent. of an amount would be. I got the decimal point in the right place only because I realized, by a sort of intuition, that it couldn't be so small an amount if put in one place nor so large an amount if put in another. It may surprise you to know that I had been employed in a bank some time before it occurred to me to figure out that thing and explain it to myself, and since then I have had many opportunities to teach others who expressed as much surprise as I experienced. I would teach a child how to render a bill at the same time simply and tactfully, explaining the processes of business. How economy is practiced by men devoting their whole energies to the production of one thing and the manner of procuring the other necessities of life by purchasing them with the proceeds of the sale of what they produced. Then move on to discounts; showing how goods can be bought cheaper for cash than on time. From this naturally would develop the fact that business as now conducted requires a great deal of money, that it is perfectly proper for men to borrow money to pay for raw material and wages, but that the sooner they are paid for what they produce the shorter the time required to use borrowed money, and the sooner they are out of debt the smaller the expenditure for interest. This will also indicate the advantages in *giving* a cash discount and will lead up to the subject of bank loans and interest and bank discount. You will observe that I am now emphasizing ***application*** which to my mind is essential at every step after the early period of grinding drill. I wouldn't teach anything without showing an application, and I am certain I couldn't learn without it. Interest and discount should embrace a thorough training in compound interest and discount, for a large percentage of business transactions calls for the exercise of those calculations. As arithmetic is generally looked upon, the divisions which I have mentioned do not seem to be very comprehensive, but I feel certain that the average business man would be completely satisfied if a young man entering his employ had a thorough mastery of them. No reasonable man expects a student fresh from school to take right hold of problems peculiar to his affairs. In fact, I think most men would rather have one with mind perfectly clear of preconceived notions, so long as he could perform with facility a question in mathematics after the local system had been explained. If a boy has been so trained that he can keep his mind fixed on what it is he is endeavoring to ascertain, and shows a fair degree of dexterity in handling figures anyone who possesses the power to make his meaning clear can mould the novice into his ways without difficulty. I think it is almost useless to attempt to teach exact business methods except as to general principles, for no two systems are exactly alike. In other words, the pupil should have a "thorough knowledge of integers and fractions and facility in handling them and above all the power of mind which a proper instruction in the subject is capable of giving." Teach neatness, teach accuracy, teach speed in the subject mentioned, and if you turn out your boys and girls in that condition we will do the rest.

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Whatever I have tried to dò in life I have tried with all my heart to do well. Whatever I have devoted myself to, I have devoted myself to completely: in great aims and in small I have always been thoroughly in earnest.—*David Copperfield.*